09/622233
522 Rec'd PCT/PTO 15 AUG 2000

LEVINE & MANDELBAUM
ATTORNEYS AT LAW
EMPIRE STATE BUILDING
SUITE 7814
350 FIFTH AVENUE
NEW YORK, N.Y. 10118

ALAN H. LEVINE

HOWARD F. MANDELBAUM

PATENTS AND TRADEMARKS

TELEPHONE: 212-239-4162

TELECOPIER: 212-629-4204

August 15, 2000

BY EXPRESS MAIL NO. EMO49966519US

Box PCT
Commissioner for Patents
Washington, DC 20231

Re: National Stage of PCT/IB99/00302
System, Device And Method For Monitoring A Plurality Of Electric Users, Particularly Household Appliances
Aisa
Our Ref: METR0290US

Sir:

Transmitted herewith for filing under 35 U.S.C. 371 are:

1. Copy of the specification for PCT International Application No. PCT/IB99/00302 published by WIPO under International Publication No. WO 99/43068 on August 26, 1999, including drawings;

2. Copy of International Preliminary Examination Report with attached amended sheets;

3. Preliminary Amendment based on the amended claims annexed to the preliminary examination search report;

4. Inventor's Declaration (to be executed) identifying the inventor and his attorneys;

5. Check No. 2742 in the amount of $970.00 for basic national fee.

It is requested that the enclosed self-addressed postcard be stamped with the official dating stamp of the U.S. Patent and

09/622233
526 Rec'd PCT/PTO 15 AUG 2000

Trademark Office and returned. If the enclosed papers are considered incomplete in any way, it is also requested that the undersigned be advised by collect telephone call to (212) 239-4162 immediately upon receipt of this correspondence.

Any unpaid fee or balance in connection with this correspondence may be charged to deposit account no. 06-0735. A duplicate of this authorization is enclosed.

Respectfully submitted

Howard F. Mandelbaum
Registration No. 27,519
Attorney for Applicant

HFM:cnt
enc.

09622233 . 150800

527 Rec'd PCT/PTC 30 OCT 2000

LEVINE & MANDELBAUM
ATTORNEYS AT LAW
EMPIRE STATE BUILDING
SUITE 7814
350 FIFTH AVENUE
NEW YORK, N.Y. 10118

ALAN H. LEVINE

HOWARD F. MANDELBAUM

PATENTS AND TRADEMARKS

TELEPHONE: 212-239-4162

TELECOPIER: 212-629-4204

CERTIFICATE OF MAILING

I certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington D.C. 20231 on October 25, 2000.

Dated: October 25, 2000

Howard F. Mandelbaum

Box PCT
Commissioner for Patents
Washington, DC 20231

Re: U.S. Patent Application Serial No. 09/622,233
System, Device And Method For Monitoring A Plurality Of Electric Users, Particularly Household Appliances
Aisa
Our Ref: METR0290US

11/02/2000 ERIMANDO 00000031 09622233
01 FC:154 130.00 OP
02 FC:966 288.00 OP

Sir:

Transmitted herewith for filing in the above referenced patent application which was filed in accordance with Rule 1.53 are the following:

- Notification of Missing Requirements Under 35 U.S.C. 371 in the United States Designated/Elected Office (DO/EO/US)
- Executed inventor's declaration
- Executed assignment with cover sheet for recordal
- Request for Extension of Time
- Credit Card Payment Form (PTO-2038) in the amount of $568.00, computed as follows:

Basic National Fee:	Previously paid
Independent claims in excess of 3:	None
Multiple dependent claims:	None
Total claims in excess of 20: 16 @ $18.00	$288.00
Late filing of declaration:	$130.00
Assignment recordal fee:	$40.00
One month extension of time	$110.00
	$568.00

09/622233
526 Rec'd PCT/PTO 15 AUG 2000

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re Application of: Aisa

For: System, Device And Method For Monitoring A Plurality Of Electric Users, Particularly Household Appliances

National Stage of Int'l Application No.: PCT/IB99/00302

International Filing Date: February 18, 1999

Attorney Docket No.: METR0290US

Levine & Mandelbaum
350 Fifth Avenue - Room 7814
New York, N.Y. 10118
(212) 239-4162

August 15, 2000

Box PCT
Commissioner for Patents
Washington D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Please enter the following amendment before computing the filing fee in the above identified patent application.

In the specification,

At page 1, in the title, delete "a Plurality of";

Please add a page of Abstract reading as follows:

--Abstract of the Disclosure

A method is described, for monitoring electric users, particularly household appliances. The electric user comprises an electronic control system having a microcontroller, memory means and interface means, said

electronic control system being programmed for generating and storing within said memory means at least diagnostic information, being representative of the efficiency status of components of the user and/or statistical information, being representative of the wear status of components of the user, and means for making the stored information available outside said control system, through said interface means.--

In the claims as set forth in the amended sheets annexed to the International Preliminary Examination Report:

Please rewrite the claims as follows:

1 (amended). Method for monitoring electric users [(C)], in particular household appliances belonging to a same household environment and connected to a network [(R)], wherein at least an electric user [(C)] is provided, comprising an electronic control system having a microcontroller, memory means and interface means, said electronic control system being programmed for generating information which relate to operating conditions of the electric user [(C)], said information being made available outside said control system through said interface means, the method being characterized by the following steps:

- the electronic control system provides for generating diagnostic information, being representative of the

efficiency status of components of the user [(C)] and/or statistical information, being representative of the wear status of components of the user [(C)],

- the electronic control system provides for storing, within said memory means, said information,
- the electronic control system provides for making the stored diagnostic and/or statistical information available outside said control system, through said interface means.

2 (amended). Method, according to claim 1, characterized in that said control system provides for updating in [the] time the diagnostic and/or statistical information stored within said memory means.

3 (amended). Method, according to claim 1, characterized in that said diagnostic information relate to the operation quality of said electric user [(C)], said operation quality being expressed through the value of a set of diagnostic parameters typical of the user [(C)].

4 (amended). Method, according to claim 1, characterized in that said statistical information relate to [an] a history of the user [(C)] from a viewpoint of the performed operations and/or functions and/or usage procedures.

5 (amended). Method, according to claim 1 [or 2], characterized in that the stored diagnostic and/or statistical information are made available through a monitoring device [(F)] which can communicate with said electronic control system through said interface means.

6 (amended). Method, according to claim 1, characterized in that said control system also provides for generating functional information, being representative of the current operating status of the electric user [(C)].

7 (amended). Method, according to claim 5, characterized in that said control system provides for transmitting the stored diagnostic and/or statistical information on a network [(R)] and that said monitoring device [(F)], which is interfaced with said network [(R)], provides for selecting, picking up, organizing and making explicit the diagnostic and/or statistical information being transmitted on said network [(R)].

8 (amended). Method, according to claim [5 and] 6, characterized in that said control system provides for transmitting said functional information on a network [(R)] and that said monitoring device [(F)], which is interfaced with said network [(R)], provides for selecting, picking up, organizing and making explicit the functional information transmitted on said network [(R)].

9 (amended). Method, according to [at least one of the previous claims] claim 5, characterized in that said monitoring device [(F)] provides for storing and/or updating within its own memory means [(ME)] the information picked up from said network [(R)], before making them explicit.

10 (amended). Method, according to [at least one of the previous claims] claim 6, characterized in that said

diagnostic and/or statistical and/or functional information are made explicit within the household environment.

12 (amended). Method, according to [at least one of the previous claims] claim 1, characterized in that at least said diagnostic and/or statistical information are made explicit or transmitted outside the household environment.

13 (amended). Method, according to claim 12, characterized in that said diagnostic and/or statistical information are transmitted to a service and/or preventive maintenance center [(H)] for said electric user [(R)].

14 (amended). Method, according to [at least one of the previous claims] claim 5, characterized in that the selection is provided of the type of information to be made explicit through said monitoring device [(F)].

15 (amended). Method, according to [at least one of the previous claims] claim 12, characterized in that the selection is provided of the transmission procedure for said diagnostic and/or statistical information at remote level.

16 (amended). Method, according to claim 13, characterized in that the service activity of said center [(H)] is based on said diagnostic information.

17 (amended). Method, according to claim 13, characterized in that the preventive maintenance activity of said center [(H)] is based at least on said statistical information.

18 (amended). Method, according to the claim 13, characterized in that the transmission of said diagnostic and/or statistical information to said center [(H)] is realized through a telephone line.

19 (amended). Method, according to the claim 13, characterized in that the transmission of said diagnostic and/or statistical information to said center [(H)] is realized through Internet.

20 (amended). System for monitoring electric users [(C)], in particular household appliances belonging to a same household environment and connected to a network [(R)], wherein at least an electric users [(C)] is provided, comprising an electronic control system having a microcontroller, memory means and interface means, said electronic control system being programmed for generating information which relate to operating conditions of the electric user [(C)], said information being made available outside said control system through said interface means, characterized in that said electronic control system is programmed for generating and storing within said memory means at least diagnostic information, being representative of the efficiency status of components of the user [(C)] and/or statistical information, being representative of the wear status of components of the user [(C)], and that means [(F)] are provided for making the stored diagnostic and/or statistical information available outside said control system, through said interface means.

21 (amended). System, according to claim 20, characterized in that said means comprises said electronic control system of said electric user, [being] programmed for that purpose.

22 (amended). System, according to claim 20, characterized in that said means comprises a monitoring device [(F)] capable of communicating with said electronic control system through said interface means.

23 (amended). System, according to claim 20, characterized in that said control system is programmed for updating in [the] time the diagnostic and/or statistical information stored within said memory means.

24 (amended). System, according to claim 20, characterized in that said diagnostic information relate to the operation quality of said electric user [(C)], said operation quality being expressed through the value of a set of diagnostic parameters typical of the user [(C)].

25 (amended). System, according to claim 20, characterized in that said statistical information relate to [an] a history of the user [(C)] from a viewpoint of the performed operations and/or functions and/or the usage procedures.

26 (amended). System, according to claim 20, characterized in that said control system is also programmed for generating functional information, being representative of the current operating status of the electric user [(C)].

27 (amended). System, according to claim 22, characterized in that said monitoring device [(F)] comprises means [(N,l,MP,V,K,L,M)] for selecting, picking up, organizing and making explicit the stored diagnostic and/or statistical information.

28 (amended). System, according to claim 22, characterized in that said control system is programmed for transmitting the stored diagnostic and/or statistical information on a network [(R)] and that said monitoring device [(F)] is interfaced with said network [(R)].

29 (amended). System, according to [claims 27 and] claim 28, characterized in that said monitoring device [(F)] comprises its own memory means [(ME)] for storing the diagnostic and/or statistical transmitted on said network [(R)].

30 (amended). System, according to claim 27, characterized in that said monitoring device [(F)] comprises a display device [(V)].

31 (amended). System, according to claim 27, characterized in that said monitoring device [(F)] comprises transmission means [(L,M)], for transmitting said stored information to a remote site, in particular through Internet.

32 (amended). System, according to claim 30, characterized in that said monitoring device [(F)] comprise interaction means [(K)] for selecting the type of information to be displayed on said display device [(V)].

33 (amended). System, according to claim 31, characterized in that said monitoring device [(F)] comprise interaction means [(K)] for activating the transmission of said stored information.

34 (amended). System, according to claim 31, characterized in that said transmission means [(L,M)] comprise a modem.

35 (amended). An electric user, in particular a household appliance, [for the use in the method according to any of claims 1 to 19 or the system according to any of claims 20 to 34] comprising an electronic control system having a microcontroller, memory means and interface means, said electronic control system being programmed for generating and storing within said memory means at least diagnostic information, being representative of the efficiency status of components of the user [(C)] and/or statistical information, being representative of the wear status of components of the user [(C)], and means for making the stored information available outside said control system, through said interface means.

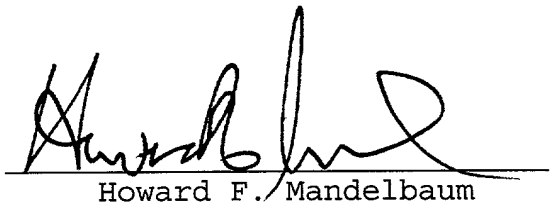
36 (amended). A monitoring device, for the use in the method according to [any of claims 1 to 19 or the system according to any of claims 20 to 34] claim 1 comprising:

- interface means [(I)];
- means for selecting [(V,L,M,R,K,MP)], picking up [(N)], organizing and making explicit said stored diagnostic and/or statistical information.

REMARKS

The foregoing amendments have been made to correct obvious typographical errors, delete reference characters, and avoid multiple dependencies in the claims, provide an abstract of the disclosure, and simplify the title.

Respectfully Submitted,



Howard F. Mandelbaum
Registration No. 27,519
Attorney for Applicants

HFM:cnt

09509813.1

09/622233
526 Rec'd PCT/PTO 15 AUG 2000

SYSTEM, DEVICE AND METHOD FOR MONITORING A PLURALITY OF ELECTRIC USERS, PARTICULARLY HOUSEHOLD APPLIANCES

DESCRIPTION

The present invention concerns a system, a device and a method thereof for monitoring a plurality of electric users, in particular household appliances connected in a network and belonging to a same household environment.

As it is known, *home automation*, i.e. exploiting electronic technology in the household environment, whose aim is to cut down managing costs of the various users and develop new comfort, is getting more and more in use. This is substantially due to the following reasons:

- an increasing spreading of consumer electronics devices, such as videorecorders, HI-FI systems, satellite receiver systems, safety and theft-safe systems, personal computers, mobile telephones, etc
- the recent significant developments related to the control systems for household appliances, which are based on the use of microcontrollers and new sensors, and are able to dialog with the external world;
- a progressive affirmation of communication *bus standards*, i.e ruling systems defining the procedures for information exchange between the various household users and the physical means such information are transmitted onto.

With reference to the latter point, it is particularly important to know that the communication means establishing itself as a standard in the household environment is the so-called *power line*, i.e. the power supply network whereto information can be sent in the form of amplitude or frequency modulated small signals The use of such a means, in fact, allows connection of household users to the network without the need of introducing new or special wiring systems.

As a result, new opportunities based right on the use of the *power line* are created, which relate to the rationalization themes of energy consumption in the home and improved

AUG.11.2000 2:16PM 00390119904182 NR.291 P.4

management of information associated with the various household users. In this frame, several proposals are already known, which are based on the use of control and supervision systems or devices for the household users, all of them characterized in that:

- they perform automatic activity, even if against an appropriate operation by the utilizer or customer for their starting configuration;
- they are classed at a hierarchical higher level compared to the household users level, i.e. developing an active control, with a *master* role, over them.

A fully alternative solution to such a "centralized" control and supervision approach of household users is disclosed in the European Patent Application EP-A-0 727 668, filed by the same Applicant hereto.

Such a document describes a set of household appliances capable of constantly receiving information concerning the total power absorption of all household users (household appliances, illumination system, air conditioning system, etc.), concerning the maximum usable power (power supply contract), the current time (clock function) and the likely different electricity cost according to variable use hours rates.

Such information are supplied by a special external sensor, which may be the same electric meter developed to that purpose, or an alternative device specifically provided. The means whereto such information are flowing may be of different type; however, the *power line* is a preferable one, i.e. the electric network itself, since there is no need for additional wiring.

The set of household appliances described in EP-A-0 727 668, each one equipped with a suitable electronic control system and adequate interfacing means to the network, is able to limit its own electric power consumption "spontaneously" and automatically, so as to maintain the total consumption of the whole household environment constantly below the limit established in the power supply agreement, requiring neither an external centralized supervision system nor any operation by the utilizer.

From US-A-4,602,340 a system is known, for distributing coded time or other information signals through the electrical gridwork of a facility such as a home, office, factory, or mobile vehicle, for purposes of information display and/or control and monitoring of equipment and activities thereof.

The present invention is based on the acknowledgment of the fact that in such a system of "smart" household appliances connected in a network, it would be useful for the utilizer and/or anybody charged with their maintenance to be informed of the operation status of the

various household appliances, as well as of their "historical" events.

Therefore, it is the main aim of the present invention to provide a monitoring system allowing the utilizer to verify from one home site or household environment site alone (preferably any site) the operation status of all "smart" appliances connected to the network and capable of communicating with the monitoring system itself.

A further significant aim of the present invention is to provide a monitoring system, which is able to acquire and retain in a non-volatile but updatable memory diagnostic and statistical data generated by each individual "smart" appliance connected in the network and adequately equipped to that purpose

A further aim of the invention is to provide a monitoring system as described above, which allows transmission of the data stored therein to a proper external location, in order to allow a remote customer service, even a "preventive" one, for the relevant household appliances.

Such aims and many others are obtained through a system, a device and a method for monitoring a plurality of electric users, in particular household appliances connected in a network, which belong to one same household environment, as described in the annexed claims which form an integral part of the present description.

Further aims, features and advantages of the present invention will become apparent from the following detailed description and the annexed drawing, which are supplied by way of non limiting example, wherein the Fig. 1 shows schematically an embodiment of the system according to the present invention as viewed in the context of a household environment

In Fig. 1, reference A indicates a power meter, which may either be a standard type, i e only apt to measure the electric power absorbed in a household environment and indicate the total power consumption, or an advanced type, i.e. comprising a remote managing system and variable use hours cost rates.

Reference B indicates an auxiliary measuring device, located downstream the power meter A, which is intended to adequately convey various information on the network R of the household environment, eventually including also the information supplied by the power meter itself. The measuring device B may advantageously also perform the function of

AMENDED SHEET

"screening" the power meter A from the communication signals circulating in the network R of the household environment, through a suitable filter known as such

The measuring device B, in particular, has suitable means to supply on the network R with those information the power meter A is unable to supply, which are required for the rationalization of the electricity consumption, according to the procedures indicated in the above mentioned patent application EP-A-0 727 668 Such information supplied by the device B vary according to the type of power meter available in the household environment, merely by way of example, the data supplied for the two types of power meters as indicated above, can be as follows

a) standard power meter.

- value of the power supply contract;
- measure of the current absorbed instant by instant by the set of household users;
- current time,
- likely variable use hours and relevant cost.

b) advanced power meter (with remote management)

- measure of the current absorbed instant by instant by the set of household users.
- current time.

As it can be noticed, the network R also represents the household communication network through which the electric users, duly equipped to that purpose, are able to exchange information, as further detailed in the following

Reference C indicates as a whole a set of household appliances belonging to the same household environment controlled by the power meter A, each appliance having a suitable interface for its connection to the conveyed-waves network R; in particular C1, C2, C3, C4, CS, C76 and C7 indicate an electric oven, a dishwasher, a refrigerator, a laundry washer, a freezer, a cooking hob and an exhaust hood, respectively.

It will be appreciated that other household users, differing from the ones usually indicated with the term "household appliances", may also belong to the set C, provided they have a special interface for their connection to the conveyed-waves network and their own "smart"

AUG.11.2000 2:17PM 00390119904182 NR.291 P.7

control system for a rationalized power consumption as described in EP-A-0 727 668

The elements mentioned so far represent a basic set of integrated household appliances, which are able to rationalize their power consumption according to the procedures already mentioned in the above European patent application (to which reference can be made for further details); the purpose of this is to avoid of exceeding the value of the maximum usable power (power supply contract) and the consequent possible electric black-outs, caused by the switching in of a thermal limiting device, usually provided inside every household power meter.

Reference E indicates a generic standard current socket, through which a device F can receive power supply and consequently information in the form of conveyed waves from the set of household appliances C, or from other users connected to the network R.

Said device F, which is equipped with its own supply cable N for connection to the network R, is provided for the local monitoring and the remote servicing of the household appliances C connected to the network, and represents the main element of the present invention, the device F is preferably equipped with a suitable buffer battery to ensure operation also in case of an electric black-out of the network R

Reference G indicates a telephone, whose line is apt to be used for the remote transmission to a *Bulletin Board Service* (BSS) of a center for the customer service or preventive maintenance of the household appliances or users C; said remote customer service and preventive maintenance center is represented schematically by a personal computer, indicated with H.

The device F has suitable means to collect various information (through the network R, by means of the cable N) from the household appliances C for their managing their storage on suitable memory means and to express them, or make them explicit, according to various procedures.

Such functions are performed by the device F with means already known per se, such as a conveniently programmed microcontroller MP, which is provided with a suitable conveyed-waves interface I and nonvolatile updatable electronic memory means ME (for example a

AMENDED SHEET

P.8 NR.291 00390119904182 2:18PM 11.2000

FLASH or EEPROM memory).

Communication from the users C to the device F, which takes place through the network R itself, is based, as mentioned above, on the well-known technique of conveyed waves, with FSK modulation *(Frequency Shift Keying)* or AFK modulation *(Amplitude Shift Keying)*, the flow of information from the various users C to the device F is ruled by suitable standard protocols, which are able to warrant a non-conflictual sharing of the same transmission means R (i.e. the electric network or power line) between the household users C in relationship with the device F and other likely users also available in the same household environment.

As said above, the information that the device F is able to collect, store and make explicit are generated by the household appliances C, which are equipped with adequate control systems to this purpose

In particular, each of said control systems has interfacing means with the communication bus consisting of the network R, and is programmed to send onto said bus, through said interfacing means, information related to the operating conditions of the household appliance. Said information are of various type and for the purposes of the present invention they can be distinguished into *functional*, *diagnostic* and *statistical* information.

Functional information concern the current operating mode of each household user capable of communicating with the device F, where such a mode is expressed through the value of a set of parameters and/or physical quantities characterizing the operation status of each user Merely by way of a non limiting example, in the instance of the refrigerator C3 such functional information may refer to the temperature value selected by the utilizer, the temperature value of the various compartments, the compressor status (ON or OFF), the opening or closing status of the doors, and so on.

Diagnostic information concern the operation quality of each household user capable of communicating with the device F, i.e. revealing the *efficiency status* of certain components related to each household user C; such an operation quality is revealed through the value of a set of diagnostic parameters, typical for each user.

SUBSTITUTE SHEET (RULE 26)

NOV.11.2000 2:18PM 00390119904182 NR.291 P.9

Merely by way of a non limiting example, in the instance of the freezer C5 diagnostic information may refer to the number of times the storage temperature has reached less cold values than - 18°C, the number of blackouts of the network R, the operation status of the temperature sensors, a likely extended open-door status, the number of switch-in times of the compressor overload-protector, the operation ratio or *duty cycle* (i.e. ON time of the compressor referred to the total cycle time = ON time + OFF time), etc.

Statistical information concern on the contrary the operation statistical data of every household user capable of communicating with the device F; such operation statistical data practically form the "history" of each user C, from a standpoint of the operations and/or functions performed and from a standpoint of use procedures by the utilizer, thus supplying and reveals on the *wear status* of both the mechanical and electric components.

Merely by way of a non limiting example, in the instance of the laundry washer C4 statistical information may refer to the total number and/or type of wash cycles selected by the utilizer, the number of washes associated with the different kinds of fabric, the quantity of clothes washed in average for each kind of fabric, the changes made by the utilizer to the temperature value (both to increase and decrease), the changes made by the utilizer to the spin speed value, the water hardness value, the number of rinses performed in average, etc

As mentioned, the above *functional, diagnostic and statistical* information are generated by the individual household appliances C, which are equipped with suitable sensors already known as such and an advanced control system.

In this frame, it should be appreciated that the microcontroller-based control system of each household appliance C is programmed for the control of all programs and functions which can be performed by the appliance itself; therefore, the control system has a complete knowledge of the appliance operation status and is perfectly able to know, instant by instant, such as in the instance of a refrigerator C3, whether the relevant electric loads (compressor, defrost heater, air circulation fan, lamp in the refrigerating or freezing compartment, etc.) are activated.

Thus, according to the above, it is clear how the control system of each household

SUBSTITUTE SHEET (RULE 26)

NOV.11.2000 2:19PM 00390119904182 NR.291 P.10

appliance C is able to generate and send to the device F information of different nature, such as related to the program or function activated by the utilizer, to the advancement step of said program or function, to the instructions inputted by the utilizer, to the timing associated with activation and deactivation of the individual electric loads, to likely improper behaviours of certain components, etc.

Always in this frame, the device F can be supplied with information obtained through internal sensors of the individual appliances C, such as the water hardness degree from the water network (for example measured by a suitable sensor available in the dishwasher C1), or the type and quantity of clothes being washed (values that the control system of the laundry washer C4 is able to obtain with techniques already known), the room temperature (for example if the refrigerator C3 is equipped with a sensor to measure such a parameter)

According to a significant feature of the present invention, further information are also encoded in the nonvolatile memory of each control system of the household appliances C, which refer to the typical consumption features of various electric loads (pumps, solenoid valves, motors, heaters, etc) of the appliance itself, under their various employment conditions, in other words, the control system of each appliance C is aware of the electric power absorbed by its various associated electric and electronic components; as a result, it is able to calculate, instant by instant, the total power consumption of the household appliance under control

According to the present invention, the result of such a calculation of the power consumption of each household appliance C (which can be used by the set of individual control systems to rationalize electric power consumption and avoid outweighing the maximum usable or contractual power value) can be used for further purposes.

In particular, such consumption information can be efficiently displayed for the utilizer in the frame of the above *functional* information (such as in view of an energy saving "consciousness"), or stored in suitable memory means as part of the above *statistical* and/or *diagnostic* information.

Moreover, the control system of each household appliance C is programmed according to

AGO.11.2000 2:19PM 00390119904182 NR.291 P.11

known techniques to periodically store at least the *diagnostic* and the *functional* information in its own memory means, and to update their contents in the time.

Similarly, the microcontroller MP of the device F is programmed to periodically receive through the network R the information generated and/or stored by the control systems of each appliance, in order to store and update them in its own memory means ME. From the above it will be appreciated how the control system of each household appliance C is able to send said *functional*, *diagnostic* and *statistical* information to the device F and how the latter is able to receive them, and/or store them, and/or update them in its own memory ME

The microcontroller MP of the device F is also programmed to make explicit, through proper means, the information the various appliances C makes available on the network R and/or stored in the memory means ME, with the following modes.

1) at local level, i.e. directly to the utilizer, by means of an adequate display V manufactured according to a known technology (liquid crystals, fluorescent tubes, LED diodes, electroluminescent panels, etc.), whose complexity level is adequate for the quantity and quality of the information to be displayed;
2) at remote level, directed to a customer service and preventive maintenance center H for said plurality of household users C

In order to allow interaction with the utilizer, the device F also has proper input means, such as a keyboard K, through which it is possible to select the type of information to be displayed at local level (i.e. on the display V of the device F), as well as activate a remote transmission system to the center H.

To allow said remote transmission of the collected information, the device F has inside a standard modem, not shown in the figure, which is connected to the home telephone line through a proper standard connection system, shown schematically with L.

A further instrument to transmit the collected information at the remote level may consist of a telephone, indicated with T in Fig 1, of the standard cordless type (DECT, or other digital or analog type) or a standard cellular or mobile type (GSM or other digital or analog type), which can be interfaced with the monitoring device F itself through a proper standard

AG0.11.2000 2:20PM 00390119904182 NR.291 P.12

connection system M, delivered with the latter.

It should be appreciated that, according to the present invention, the likely transmission of information through the monitoring device F to the remote site H is performed in conformity with the laws in force in the various countries protecting citizens' *privacy*; therefore, in other words, such a transmission occurs under the full control of the utilizer, who can decide what type of information has to be sent, the transmission procedure and the relevant frequency.

As to the remote site H, this can be represented as said above by a customer service center for the household users C associated with the device F.

This center is provided to perform a customer service and preventive maintenance activity for the household appliances C, as planned by a proper agreement entered with the utilizer Such a customer service activity is based on the *diagnostic* data sent by the utilizer to the center through the device F (as said, *diagnostic* data are generated by the household appliances C, stored in their memory means, transferred periodically to the memory means ME of the device F and then transmitted by the latter to the center H) Preventive maintenance activity, beside said diagnostic data, is also and above all based on the *statistical* data, which are sent to the service center through the device F (as said, also *statistical* data are generated by the household appliances C, stored in their memory means, periodically transferred to the memory means ME of the device F, and then transmitted by the latter to the center H).

Concerning the transmission procedure of the information to said customer service and preventive maintenance center, this can be a manual type, i.e handled directly by the utilizer, or automatic (periodic transmission of information governed by a specific customer service agreement); in both instances, advantageously for the utilizer, information transmission can be made through a toll-free call to a special number of the center itself.

From a practical standpoint the device F operates as follows

Functional information, i e concerning the current operating procedure of every household appliance C are generated by their own control systems and inputted in the network R for

AUG.11.2000 2:20PM 0039011990418Z NR.291 P.13

the benefit of the device F (as previously mentioned, transmission of information from the various users C to the device F is controlled by appropriate standard protocols), and the device F, duly programmed for that specific purpose, will make said information explicit on its own display V.

The display modes on the display V may be of various type For instance, it can be thought of a sequential display of the operation parameters of all active household appliances C. thus, the display V will first show for example the parameters related to the oven C1. followed by the parameters related to the dishwasher C2, then the ones related to the refrigerator C3. and so on.

A further possibility is to provide a display "on request" of the parameters of the appliance C to be monitored from time to time; in this instance, the appliance involved is selected by pressing a special push-button on the keyboard K, and the microcontroller MP will enable the display V to show only the operational parameters of the selected appliance

In a possible embodiment of the present invention, the control systems of the household appliances C make available on the network R all functional information they are able to generate; in this frame, the device F has eventually the function of operating as a "filter", for displaying only the information selected by the utilizer through the keyboard K However, nothing hinders the possibility of programming the device F to "inquire" a specific appliance C with a query placed by the utilizer through the keyboard K.

It is pointed out that the microcontroller MP can favorably be programmed also to draw automatically the attention of the utilizer (for example through a flashing of the display V, or the activation of an acoustic alarm eventually available in the device F), should any of the household appliances C introduce in the network R information related to an improper operating condition (such as jammed impellers in the dishwasher C2, extended open door condition in the refrigerator C3, accidental blow-off of a burner on the hob C6, all conditions detectable by sensing means already known as such)

However, it is clear, that an adequate presetting of the microcontroller MP through programming techniques already known allows implementation of various display

SUBSTITUTE SHEET (RULE 26)

possibilities on the display V, and the selection through the keyboard K of the type and complexity level of the functional information to be made available (save that these are generated in an automatic and autonomous way by the control systems of the appliances C)

It has also to be remembered that, for the display purposes on the display V, temporary storage of the functional information can be provided, in the memory means ME. if so required

Diagnostic information, i.e. concerning the operation quality of each household appliance C, are generated, stored and updated with time by the relevant control systems Such information are then periodically let in the network R, always through the control systems of the individual appliances C, for their transfer to a special area of the memory means ME of the device F.

Also transmission of these data from the control system of each appliance C to the microcontroller MP and from the latter to the memory means ME occurs automatically, in the sense that the same control systems of the appliances C are programmed to perform a data transfer at periodic terms (such as for example once a day), either spontaneously or upon request from the device F.

Diagnostic information stored in the memory means ME are then transferred, by means of the telephone G or T, through the microcontroller MP to the service center H.

The microcontroller MP can be programmed to perform such a transmission at remote level in an automatic mode, at periodic terms, and eventually also following a suitable utilizer's instruction inputted through the keyboard K.

Also *statistical* information, i.e the data forming the "history" of each user, based on their operations and/or functions performed as well as on usage procedures by the utilizer, are generated, stored and updated with time by their relevant control systems. As for the instance of *diagnostic* information, also statistical information are periodically admitted to the network R, to be then transferred to a special memory means ME of the device F

Also the transmission of these data from the control system of each appliance C to the microcontroller MP and from the latter to the memory means ME is automatic, in the sense

AG0.11.2000 2:22PM 00390119904182 NR.291 P.15

that the control systems of the appliances C are programmed to perform data transfer at periodic terms, either spontaneously or upon request of the device F.

Also in this instance, *statistical* information stored in the memory means ME are then transferred through the microcontroller MP, by means of the telephone G or T, to the service center H; the microcontroller MP can be programmed to perform such transmission at remote level in an automatic mode, at regular intervals, and eventually following a suitable utilizer's instruction inputted through the keyboard K.

Similarly to the above concerning *diagnostic* information, transmission of statistical data is performed under the utilizer's full control, in conformity to the laws in force in the various countries protecting citizens' *privacy*.

As to the physical realization of the monitoring device F, this can freely be either portable or transportable or fixed type.

In the first instance, the device F will be apt to be taken to any place of the home environment where a power socket E is available, i.e. it can be efficiently used by any individuals compelled to remain for longer time in determined areas of the home environment, due to deambulation problems (such as in the instance of an individual with temporary handicap).

In the instance of a fixed device F, it may be associated with a set of users pertaining to a homogeneous context of the home environment, as for instance the kitchen. In this case, the device F can be integrated in the furniture (let us think for instance of the so-called *sectional kitchens*, i.e having a modular structure) and represent a typical element of said environment to be adapted to the style of the kitchen itself and relevant trade-mark associated with the supplier of the kitchen furniture

Thus, the device F can take most variable configurations: either as in-sight monitoring board or hidden inside a cabinet door, as a telephone stand, as a wall clock with an associated display showing the status of the various household appliances C, as a lamp comprised element or other knick-knack, etc.

Back to the typical kitchen environment, the set of the users C may consist of the totality or

SUBSTITUTE SHEET (RULE 26)

a part of the following household appliances: gas or electric oven C1 (including the microwave oven), dishwasher C2, refrigerator C3, laundry washer C4, freezer C5, gas or electric hob (including the induction one) C6, exhaust hood C7, electric or gas boiler

At least some of these appliances can be of the built-in type, i.e. incorporated inside cabinets representing the furniture of the kitchen environment itself. In this specific case, since the appliances are incorporated inside the cabinets, the physical means for the transmission of information to the device F could be, as a possible low-cost alternative for the electric network R itself, a simple duplex telephone cable type, or other cable with two or more wires, characterized by a *multi-point* serial communication protocol, i e. wherein a certain number of appliances are connected to the same serial line, each one identified by a well determined address. Such a solution should be considered specific for a modular kitchen and is perfectly compatible with the idea of not requesting the final utilizer for any additional wiring besides the pre-existing electric network; in such a case, in fact, a specific wiring for the built-in appliances C would be delivered by the same furniture supplier as an integral optional part of the modular kitchen itself

As previously mentioned, a further possible function to be associated with the device F is to contribute to the rationalization of the power consumption of the household users according to the solution described in the above European patent application EP-A-0 727 668

In such an instance, the monitoring device F will be programmed to receive from one source alone, through the same network R, and display the total absorption of electric power of the whole household environment, as well as the value of the power supply contract, i e the maximum electric power usable according to said contract.

Such an information source on the total absorption of electric power of the whole household environment and on the value of the power supply agreement can be obtained as said above (and as described in the above patent application EP-A-0 727 668), through a suitable power meter or the appropriate additional measuring device B located downstream the power meter itself.

Eventually, the device F may also be used to make explicit on the display V either

automatically or on utilizer's request the information related to the instantaneous consumption of each individual appliance, which the relevant control system is able to calculate as previously described.

The likely function of the device F for the purposes of rationalizing electric consumption is particularly interesting in the instance of a modular kitchen with built-in household appliances C connected to a serial network, as described above.

In such an event, in fact, the device F may be favorably programmed, besides performing its own monitoring functions, to constantly inform the built-in household appliances C of the kitchen environment - provided they are connected through a serial network with electric cable or duplex telephone type cable (if not equipped to dialog directly with the power meter A and/or the measuring device B through the electric network R itself) - of the available value of the residual power, obtained as the difference between the value of the power supply contract and the total power absorbed; in other words, in such an application the device F would be an interface itself between the conveyed-waves network R and the network provided for the built-in household appliances.

On the contrary, the electronic control systems, associated with the monitoring device F, will be so programmed to self-limit the absorption of the electric power of the respective built-in household appliances C based on the value of the residual power and according to appropriate priority criteria (contained in the memory of the control system itself of each individual household appliance), with the aim to ensure that the value of the total power absorbed by the whole home environment will never exceed the value of the power supply contract

As a result, the system consisting of the above device F and of the set of built-in household appliances connected through a dedicated network, each one of them equipped with the above appropriate control system, will be able to constantly avoid in a fully automatic mode, the operation of the thermal limiting device associated with the power meter, which switches in anytime the power absorption of the whole home environment exceeds the value of the power supply contract; thus, the utilizer is warranted a new performance of a

AGO.11.2000 2:23PM 00390119904182 NR.291 P.18

modular kitchen, represented by the suppression of black-outs due to accidental power overabsorptions and by the consequent saving on the electric bill (since the cost of the absorbed power over the limit value of the power supply agreement will tend to be always higher compared to the cost of the electricity absorbed under normal conditions).

Obviously, such a performance of the device F is not necessarily limited to the instance of a modular kitchen, but can also be provided for all household appliances connected to the network R of a home environment, provided they conform to EP-A-0 727 668

The features of the present invention are clear from the above description

In particular, a system and a monitoring method have been described, based on the use of a suitable device (F) capable of collecting through a suitable communication network R (preferably consisting of the electric supply network itself) and storing on an appropriate nonvolatile electronic memory (ME) both the "functional", "diagnostic" and "statistical" information generated by one or more household users (C), each one of them being equipped with a control system capable of generating such information and supply them adequately through said network (R) to said device (F).

Said device (F) according to the present invention also contains appropriate means (V, L, M) for making explicit such information, at local level directly to the utilizer and/or at remote level to a special service and preventive maintenance center H

Also the advantages of the present invention are clear from the above description

According to the invention, the utilizer or anybody in charge of the maintenance of the household appliances has the possibility of being informed of their operating status, wear conditions and "historical" events.

Thus, the utilizer is able to verify from one place alone in the home the operating status of all household appliances connected to a same network; equally, information of various kind related to the household appliances may be transmitted to an appropriate external place, so as to allow for an efficient remote servicing, even of a "preventive" type, of the household appliances themselves, or for simplify the local maintenance operation.

Another important advantage of the invention is the provision of an instrument apt to

SUBSTITUTE SHEET (RULE 26)

AGO.11.2000 2:24PM 0039011990418Z NR.291 P.19

acquire and retain in a nonvolatile memory all diagnostic and statistical data generated day by day by each individual appliance connected to the network, and properly equipped to such purpose, where said data can prove useful for various events (maintenance. repair, suggestion for use, and so on).

It is obvious that many changes are possible for the man skilled in the art to the system, the device and the method for monitoring a plurality of electric users described above by way of example, without departing from the novelty spirit of the inventive idea.

For example, in an especially advantageous embodiment of the invention, the connection of the device F to the system of the appliances C may be of the self-installing type, commonly known with the name of *plug & play*, i.e. a type where no programming operation of the system is required, not even during installation.

Another possible variant of the system described above is to provide the connection to the network R of a personal computer, having an appropriate conveyed-waves interface and appropriate software, which allows the utilizer to inquire the device F.

In such an instance, then, the device F would be apt to reveal *functional, diagnostic* and *statistical* information at remote level, though always remaining within the home environment, i e. on the personal computer monitor, as requested from time to time by the utilizer through the above software

Similarly, if the mentioned personal computer is equipped with its own modem and supported by the above software on issue, it could be used by the utilizer to perform the remote transmission of the *diagnostic* and *statistical* information to the outside of the home environment, in this event, the access to the remote site H of the service and preventive maintenance center could also be advantageously possible through Internet

AMENDED SHEET

AUG.11.2000 2:24PM 00390119904182 NR.291 P.20

CLAIMS

1. Method for monitoring electric users (C), in particular household appliances belonging to a same household environment and connected to a network (R), wherein at least an electric user (C) is provided, comprising an electronic control system having a microcontroller, memory means and interface means, said electronic control system being programmed for generating information which relate to operating conditions of the electric user (C), said information being made available outside said control system through said interface means, the method being characterized by the following steps:

- the electronic control system provides for generating diagnostic information, being representative of the efficiency status of components of the user (C) and/or statistical information, being representative of the wear status of components of the user (C),
- the electronic control system provides for storing, within said memory means, said information,
- the electronic control system provides for making the stored diagnostic and/or statistical information available outside said control system, through said interface means.

2. Method, according to claim 1, characterized in that said control system provides for updating in the time the diagnostic and/or statistical information stored within said memory means.

3. Method, according to claim 1, characterized in that said diagnostic information relate to the operation quality of said electric user (C), said operation quality being expressed through the value of a set of diagnostic parameters typical of the user (C).

4. Method, according to claim 1, characterized in that said statistical information relate to an history of the user (C) from a viewpoint of the performed operations and/or functions and/or usage procedures.

5. Method, according to claim 1 or 2, characterized in that the stored diagnostic and/or statistical information are made available through a monitoring device (F) which can communicate with said electronic control system through said interface means.

6. Method, according to claim 1, characterized in that said control system also

AMENDED SHEET

provides for generating functional information, being representative of the current operating status of the electric user (C).

7. Method, according to claim 5, characterized in that said control system provides for transmitting the stored diagnostic and/or statistical information on a network (R) and that said monitoring device (F), which is interfaced with said network (R), provides for selecting, picking up, organizing and making explicit the diagnostic and/or statistical information being transmitted on said network (R).

8. Method, according to claim 5 and 6, characterized in that said control system provides for transmitting said functional information on a network (R) and that said monitoring device (F), which is interfaced with said network (R), provides for selecting, picking up, organizing and making explicit the functional information transmitted on said network (R).

9. Method, according to at least one of the previous claims, characterized in that said monitoring device (F) provides for storing and/or updating within its own memory means (ME) the information picked up from said network (R), before making them explicit.

10. Method, according to at least one of the previous claims, characterized in that said diagnostic and/or statistical and/or functional information are made explicit within the household environment.

12. Method, according to at least one of the previous claims, characterized in that at least said diagnostic and/or statistical information are made explicit or transmitted outside the household environment.

13. Method, according to claim 12, characterized in that said diagnostic and/or statistical information are transmitted to a service and/or preventive maintenance center (H) for said electric user (R).

14. Method, according to at least one of the previous claims, characterized in that the selection is provided of the type of information to be made explicit through said monitoring device (F).

15. Method, according to at least one of the previous claims, characterized in that the selection is provided of the transmission procedure for said diagnostic and/or statistical information at remote level.

16. Method, according to claim 13, characterized in that the service activity of said center (H) is based on said diagnostic information.

17. Method, according to claim 13, characterized in that the preventive maintenance activity of said center (H) is based at least on said statistical information.

18. Method, according to the claim 13, characterized in that the transmission of said diagnostic and/or statistical information to said center (H) is realized through a telephone line.

19. Method, according to the claim 13, characterized in that the transmission of said diagnostic and/or statistical information to said center (H) is realized through Internet.

20. System for monitoring electric users (C), in particular household appliances belonging to a same household environment and connected to a network (R), wherein at least an electric users (C) is provided, comprising an electronic control system having a microcontroller, memory means and interface means, said electronic control system being programmed for generating information which relate to operating conditions of the electric user (C), said information being made available outside said control system through said interface means, characterized in that said electronic control system is programmed for generating and storing within said memory means at least diagnostic information, being representative of the efficiency status of components of the user (C) and/or statistical information, being representative of the wear status of components of the user (C), and that means (F) are provided for making the stored diagnostic and/or statistical information available outside said control system, through said interface means.

21. System, according to claim 20, characterized in that said means comprises said electronic control system of said electric user, being programmed for that purpose.

22. System, according to claim 20, characterized in that said means comprises a monitoring device (F) capable of communicating with said electronic control system

through said interface means.

23. System, according to claim 20, characterized in that said control system is programmed for updating in the time the diagnostic and/or statistical information stored within said memory means.

24. System, according to claim 20, characterized in that said diagnostic information relate to the operation quality of said electric user (C), said operation quality being expressed through the value of a set of diagnostic parameters typical of the user (C).

25. System, according to claim 20, characterized in that said statistical information relate to an history of the user (C) from a viewpoint of the performed operations and/or functions and/or the usage procedures.

26. System, according to claim 20, characterized in that said control system is also programmed for generating functional information, being representative of the current operating status of the electric user (C).

27. System, according to claim 22, characterized in that said monitoring device (F) comprises means (N,I,MP,V,K,L,M) for selecting, picking up, organizing and making explicit the stored diagnostic and/or statistical information.

28. System, according to claim 22, characterized in that said control system is programmed for transmitting the stored diagnostic and/or statistical information on a network (R) and that said monitoring device (F) is interfaced with said network (R).

29. System, according to claims 27 and 28, characterized in that said monitoring device (F) comprises its own memory means (ME) for storing the diagnostic and/or statistical transmitted on said network (R).

30. System, according to claim 27, characterized in that said monitoring device (F) comprises a display device (V).

31. System, according to claim 27, characterized in that said monitoring device (F) comprises transmission means (L,M), for transmitting said stored information to a remote site, in particular through Internet.

32. System, according to claim 30, characterized in that said monitoring device (F)

AMENDED SHEET

comprise interaction means (K) for selecting the type of information to be displayed on said display device (V).

33. System, according to claim 31, characterized in that said monitoring device (F) comprise interaction means (K) for activating the transmission of said stored information.

34. System, according to claim 31, characterized in that said transmission means (L,M) comprise a modem.

35. An electric user, in particular a household appliance, for the use in the method according to any of claims 1 to 19 or the system according to any of claims 20 to 34 comprising an electronic control system having a microcontroller, memory means and interface means, said electronic control system being programmed for generating and storing within said memory means at least diagnostic information, being representative of the efficiency status of components of the user (C) and/or statistical information, being representative of the wear status of components of the user (C), and means for making the stored information available outside said control system, through said interface means.

36. A monitoring device, for the use in the method according to any of claims 1 to 19 or the system according to any of claims 20 to 34 comprising:

- interface means (I);
- means for selecting (V,L,M,R,K,MP), picking up (N), organizing and making explicit said stored diagnostic and/or statistical information.

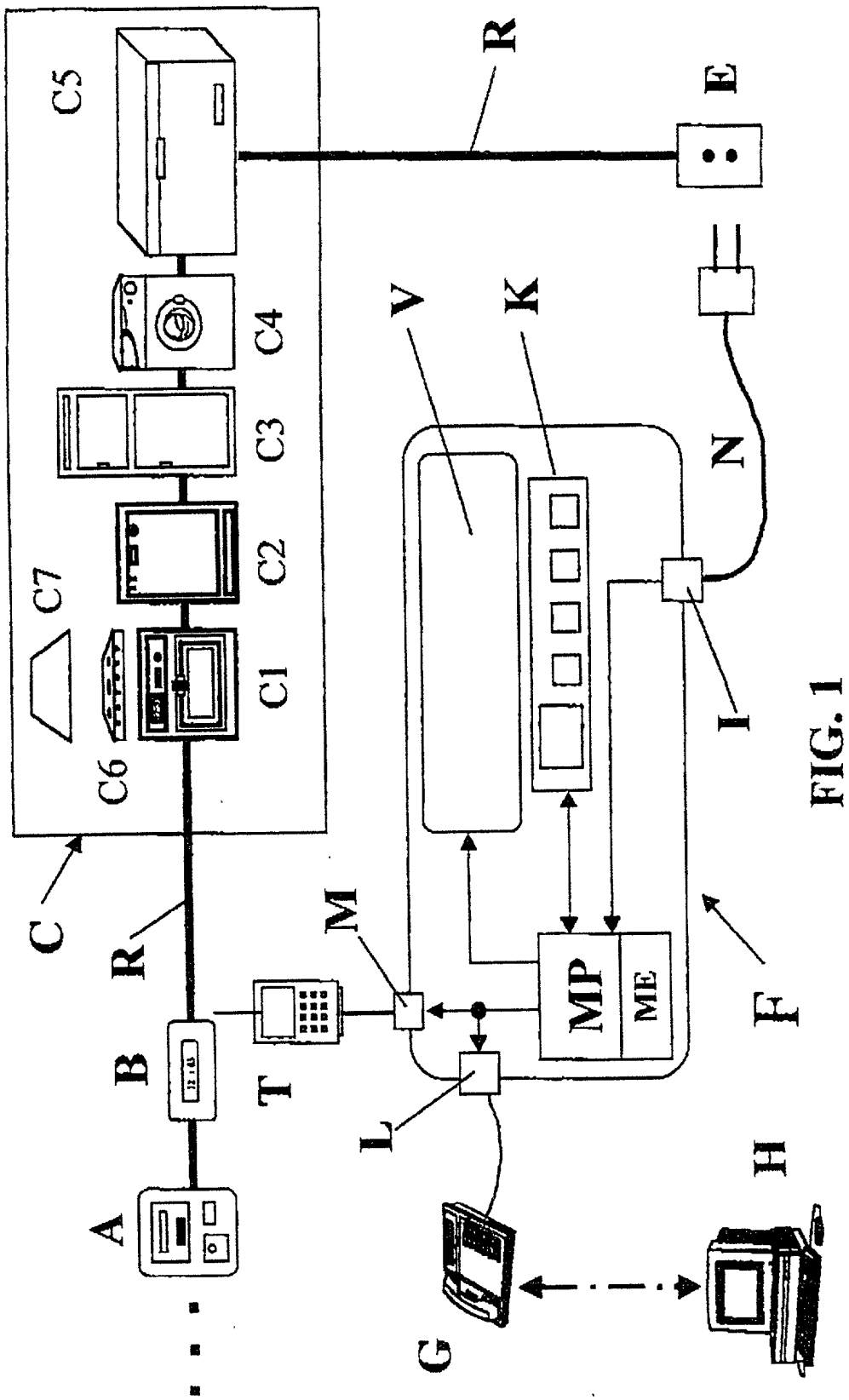


FIG. 1

AGO.11.2000 2:28PM 0039011990418Z NR.291 P.28

Declaration for Patent Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled System, Device And Method For Monitoring A Plurality Of Electric Users, Particularly Household Appliances the specification of which was filed on February 18, 1999 as PCT International application Number PCT/IB99/00302 and was amended on May 22, 2000.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to in the oath or declaration.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under 35 U.S.C.§ 119(a) - (d) or 35 U.S.C.§ 365 (b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT International Application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International Application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Italian Application No. TO98A000134 filed February 20, 1998

I hereby claim the benefit under 35 U.S.C.§ 119(e) of any United States provisional application(s) listed below.

None

I hereby claim the benefit under 35 U.S.C.§ 120 of any United States application(s), or 35 U.S.C.§ 365 (c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 35 U.S.C. § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

None.

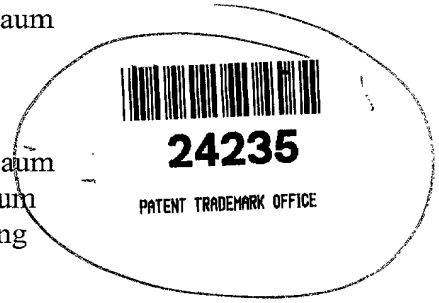
I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Alan H. Levine, Registration No. 19,185; Howard F. Mandelbaum, Registration No. 27,519.

Address all telephone calls to:

Alan H. Levine
Howard F. Mandelbaum
(212) 239-4162

Address all correspondence to:

Alan H. Levine
Howard F. Mandelbaum
Levine & Mandelbaum
Empire State Building
350 Fifth Avenue
Suite 7814
New York, N.Y. 10118



I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of inventor: Valerio Aisa

Inventor's signature: Valerio Aisa

Date: 22/03/2000

Residence: Fabriano, Italy ITX

Citizenship: Italy

Post Office Address: Via Serraloggia 78A
I-60044 Fabriano, Italy